

WHAT IS CLAIMED IS:

1. A package structure for a semiconductor device comprising:
 - a substrate having a main surface and a back surface;
 - 5 a semiconductor chip formed on the main surface of said substrate;
 - a package covering said semiconductor chip;
 - a plurality of radiation protrude electrodes formed on the back surface of said substrate in a chip area where said semiconductor chip is located, each of said radiation protrude electrodes formed with a first pitch so that said radiation protrude electrodes make one body joining layer when the package structure is
 - 10 subjected to a heat treatment; and
 - a plurality of connection protrude electrodes formed on the back surface of said substrate in a peripheral area of the chip area, each of said connection protrude electrodes formed with a second pitch which is larger than the first pitch
 - 15 so that said connection protrude electrodes stay individual when the package structure is subjected to a heat treatment.
2. A package structure according to claim 1, wherein said radiation protrude electrodes and connection protrude electrodes are solder bumps.
- 20 3. A package structure according to claim 1, wherein said connection protrude electrodes are electrically connected to pads of said semiconductor chips.
4. A package structure according to claim 1, wherein said substrate
- 25 includes radiation plate high coefficient of thermal conductivity formed on the back surface in the chip region of said substrate, and wherein said radiation protrude electrodes are formed on the radiation plate.

5. A package structure according to claim 4, wherein said substrate has a relay portion having high coefficient of thermal conductivity attached said semiconductor chip and the radiation plate.

6. A package structure according to claim 5, wherein said relay portion is attached entire back surface of said semiconductor chip.

7. A package structure according to claim 1, wherein said radiation protrude electrodes and connection protrude electrodes have the same diameter.

8. A package structure according to claim 7, wherein the first pitch is about 1 to 1.4 times of the diameter of the electrodes, and the second pitch is about 1.6 to 1.7 times of the diameter of the electrodes.

9. A method of mounting a semiconductor device on a circuit board comprising the step of:

providing the semiconductor device including,

a plurality of radiation protrude electrodes formed on a back surface of a substrate in a chip area where a semiconductor chip is located, each of said radiation protrude electrodes formed with a first pitch, and

a plurality of connection protrude electrodes formed on the back surface of said substrate in a peripheral area of the chip area, each of said connection protrude electrodes formed with a second pitch which is larger than the first pitch;

providing the circuit board including a radiation pad located in corresponding position to the radiation protrude electrodes and a plurality of connection pads located in corresponding position to the connection protrude electrodes;

mounting the semiconductor device to the circuit board so that the radiation protrude electrodes are contacted to the radiation pad and that the connection protrude electrodes are contacted to the connection pads; and

subjecting the mounted semiconductor device to a heat treatment so that the radiation protrude electrodes make one body joining layer and that the connection protrude electrodes stay individual.

10. A method of mounting a semiconductor device according to claim 9, wherein said radiation protrude electrodes and connection protrude electrodes are solder bumps.

11. A method of mounting a semiconductor device according to claim 9, wherein said radiation protrude electrodes and connection protrude electrodes have the same diameter.

12. A method of mounting a semiconductor device according to claim 11, wherein the first pitch is about 1 to 1.4 times of the diameter of the electrodes, and the second pitch is about 1.6 to 1.7 times of the diameter of the electrodes.

13. A method of mounting a semiconductor device according to claim 9, wherein the radiation pad has a plurality of radiation pads located at the corresponding positions to the radiation protrude electrodes.

14. A method of mounting a semiconductor device according to claim 9, wherein the radiation pad has an area covering the chip area of the substrate.

15. A package structure for a semiconductor device comprising:
a substrate having a main surface and a back surface, said substrate

having a recess on the back surface;

a semiconductor chip formed in the recess of said substrate so that a back surface of said semiconductor chip and the back surface of said substrate constitute the same plane substantially;

5 a plurality of radiation protrude electrodes formed on the back surface of said semiconductor chip, each of said radiation protrude electrodes formed with a first pitch so that said radiation protrude electrodes make one body joining layer when the package structure is subjected to a heat treatment; and

10 a plurality of connection protrude electrodes formed on the back surface of said substrate, each of said connection protrude electrodes formed with a second pitch which is larger than the first pitch so that said connection protrude electrodes stay individual when the package structure is subjected to a heat treatment.

15 16. A package structure according to claim 15, wherein said radiation protrude electrodes and connection protrude electrodes are solder bumps.

17. A package structure according to claim 15, wherein said connection protrude electrodes are electrically connected to pads of said semiconductor chips.

20 18. A package structure according to claim 15, wherein said radiation protrude electrodes and connection protrude electrodes have the same diameter.

25 19. A package structure according to claim 18, wherein the first pitch is about 1 to 1.4 times of the diameter of the electrodes, and the second pitch is about 1.6 to 1.7 times of the diameter of the electrodes.